(No Model.) 5 Sheets—Sheet 1.

C. KEHR.

MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 464,940. Patented Dec. 8, 1891.

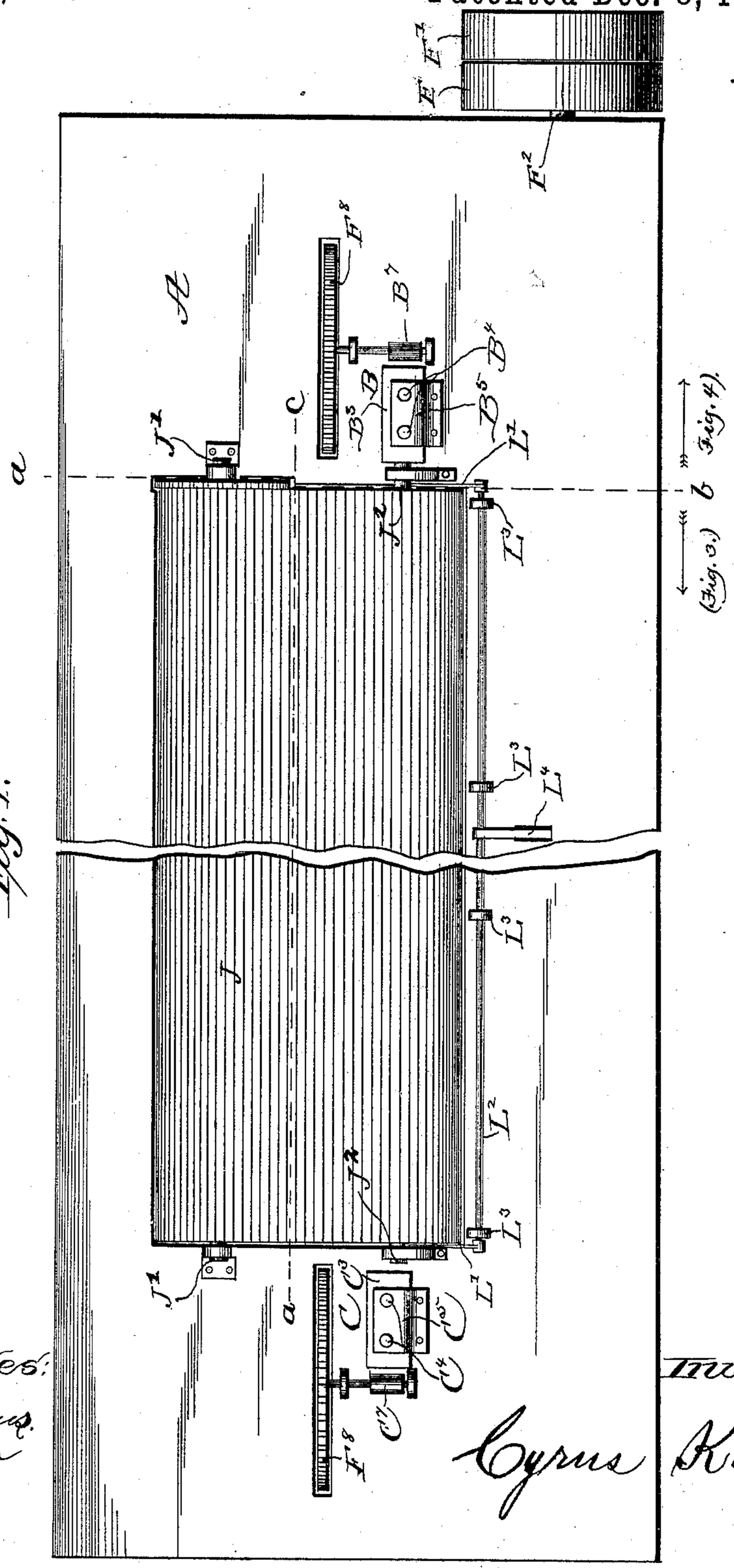

Fig. 1.

Witnesses:
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Ambrose Rizdon

Inventor
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(No Model.)

5 Sheets—Sheet 2.

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MACHINE FOR WEAVING COILED WIRE FABRIC.

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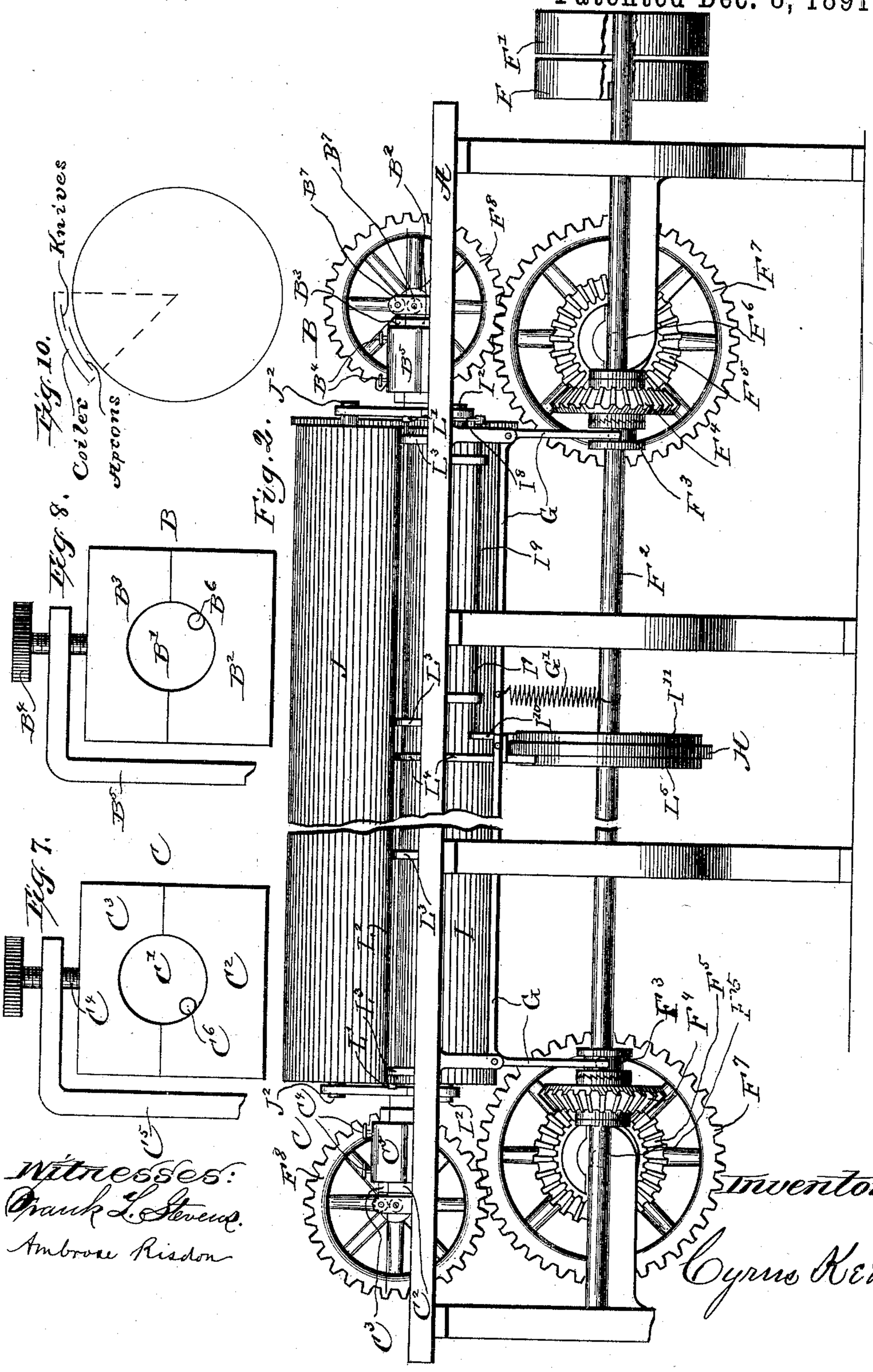

Witnesses:
Frank L. Stevens.
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Inventor:
Cyrus Kehr.

(No Model.) 5 Sheets—Sheet 3.

C. KEHR.

MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 464,940. Patented Dec. 8, 1891.

Fig. 3.

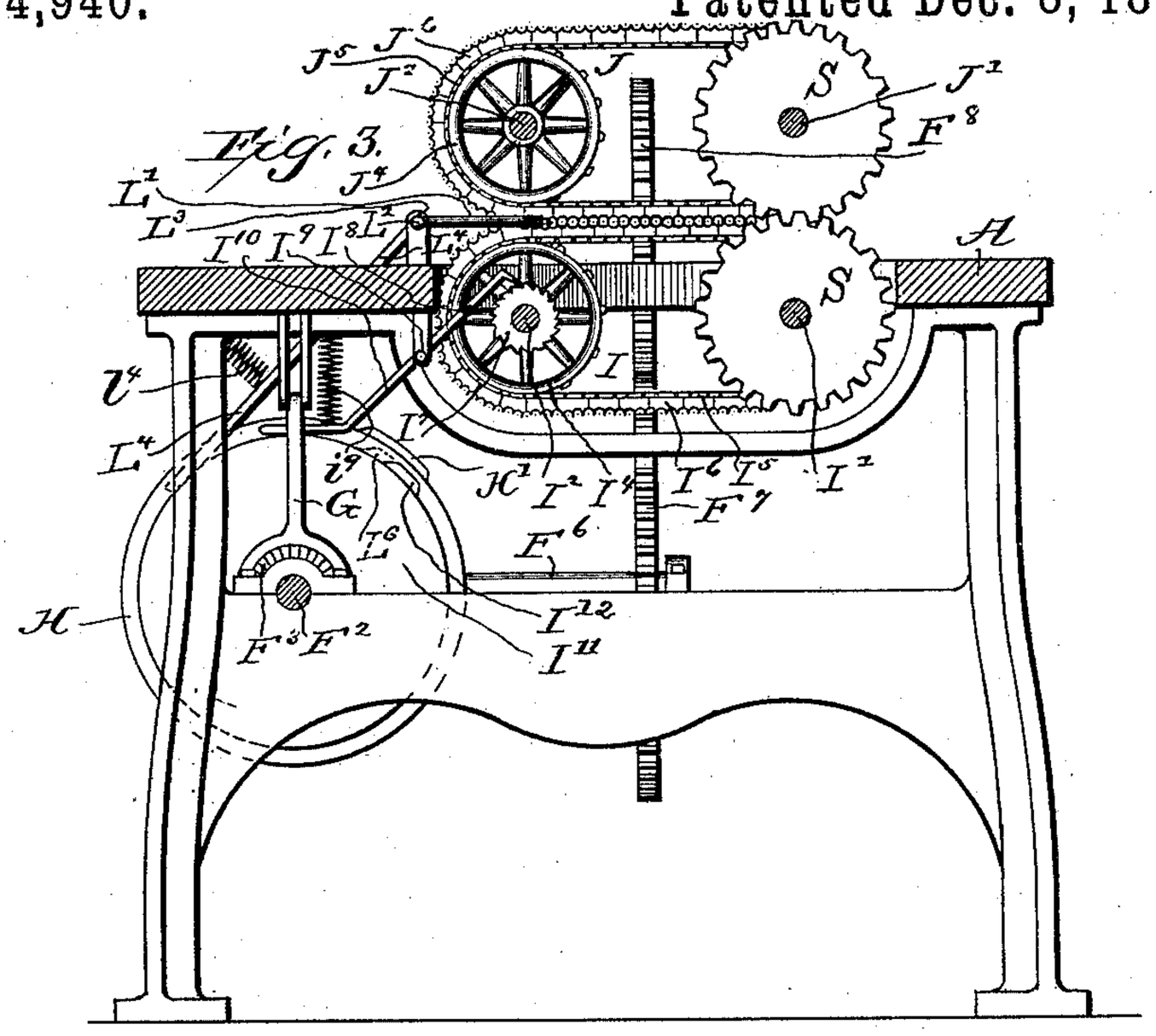
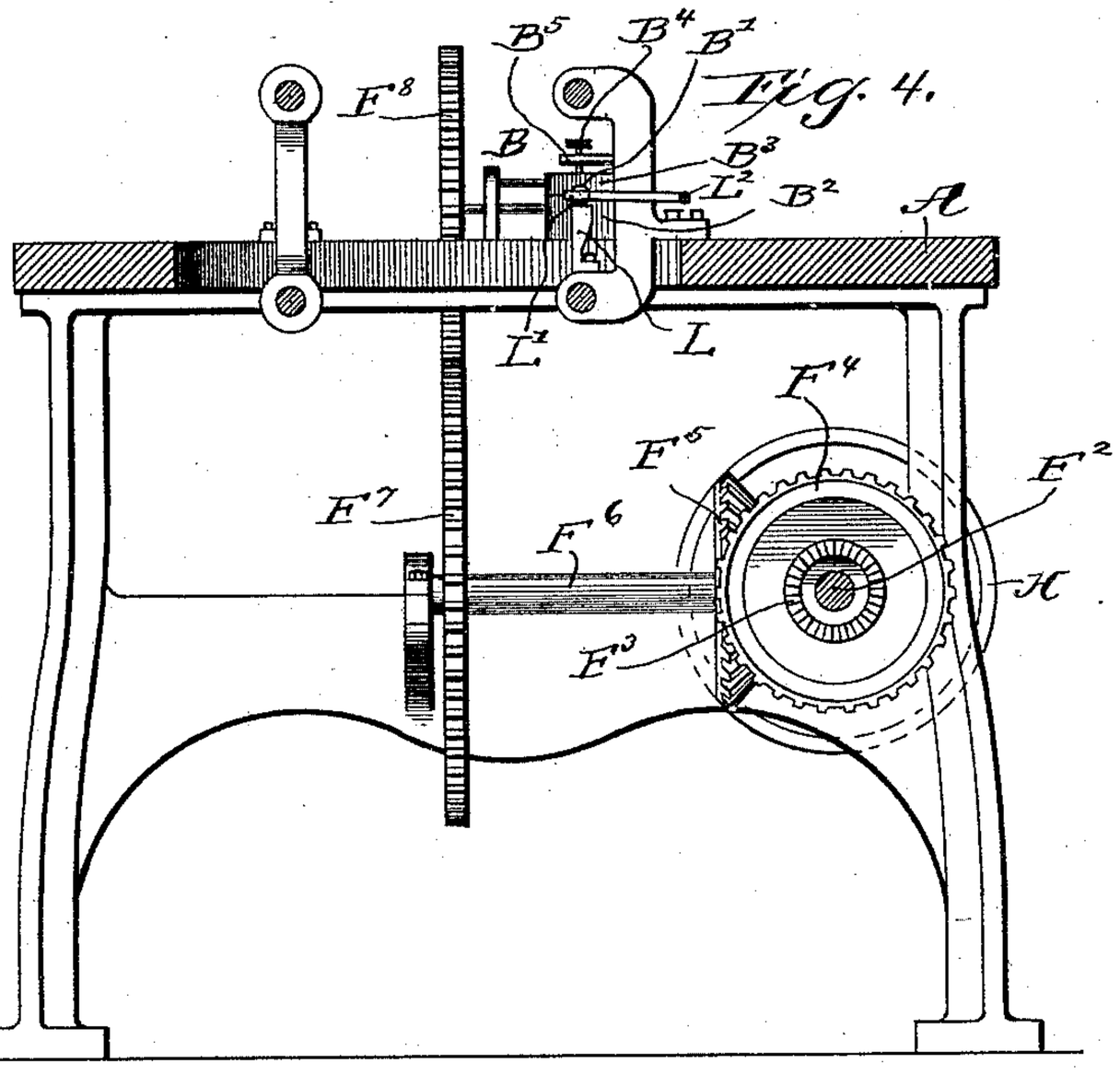


Fig. 4.



Witnesses:
Frank L. Stevens.
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(No Model.) 5 Sheets—Sheet 4.

C. KEHR.

MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 464,940. Patented Dec. 8, 1891.

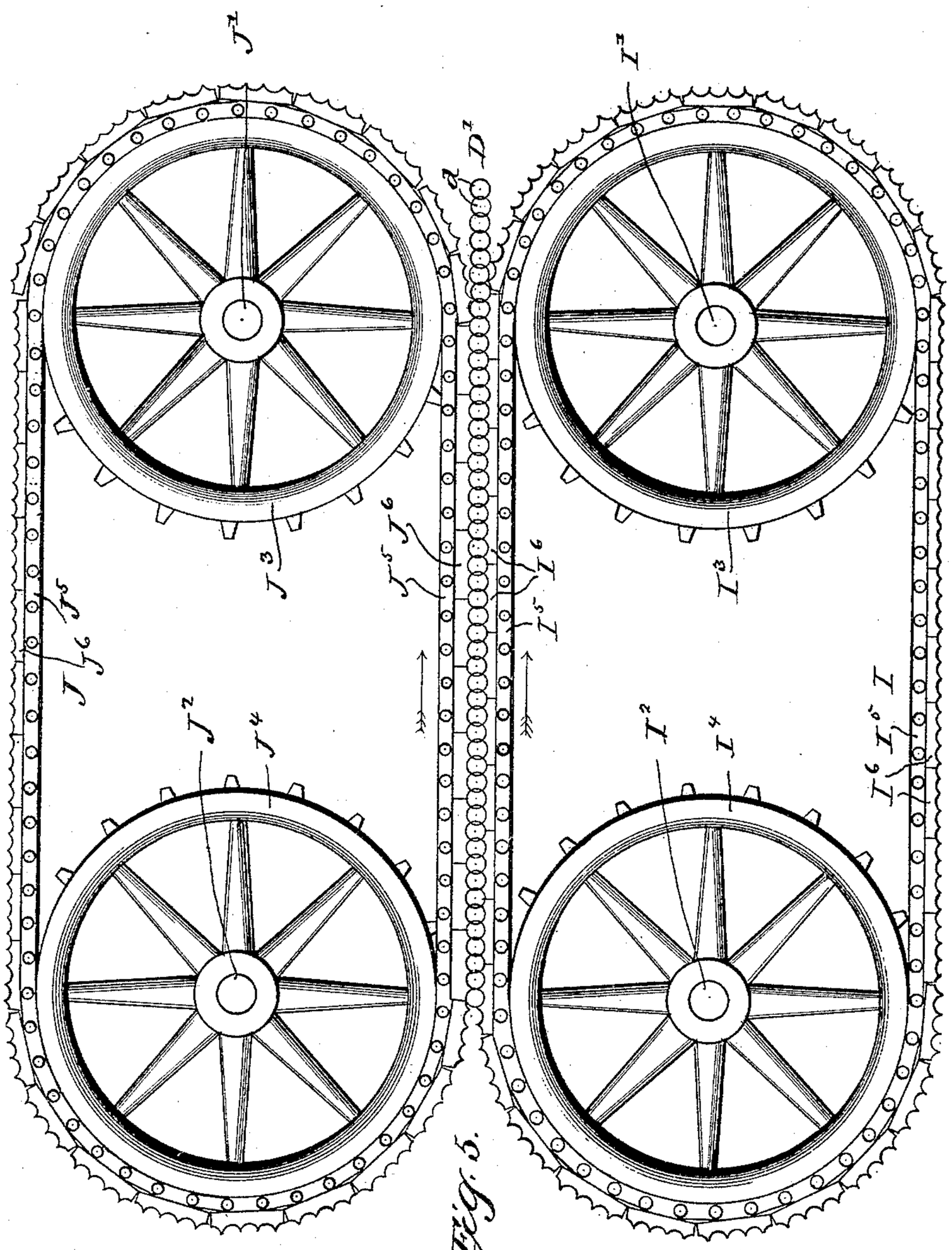

Fig. 5.

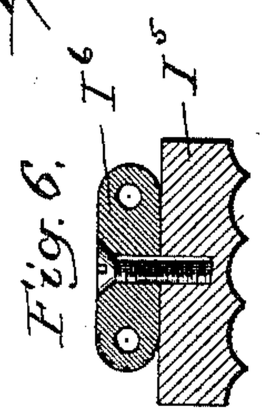

Fig. 6.

Witnesses:
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(No Model.) 5 Sheets—Sheet 5.

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MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 464,940. Patented Dec. 8, 1891.

Fig. 9.

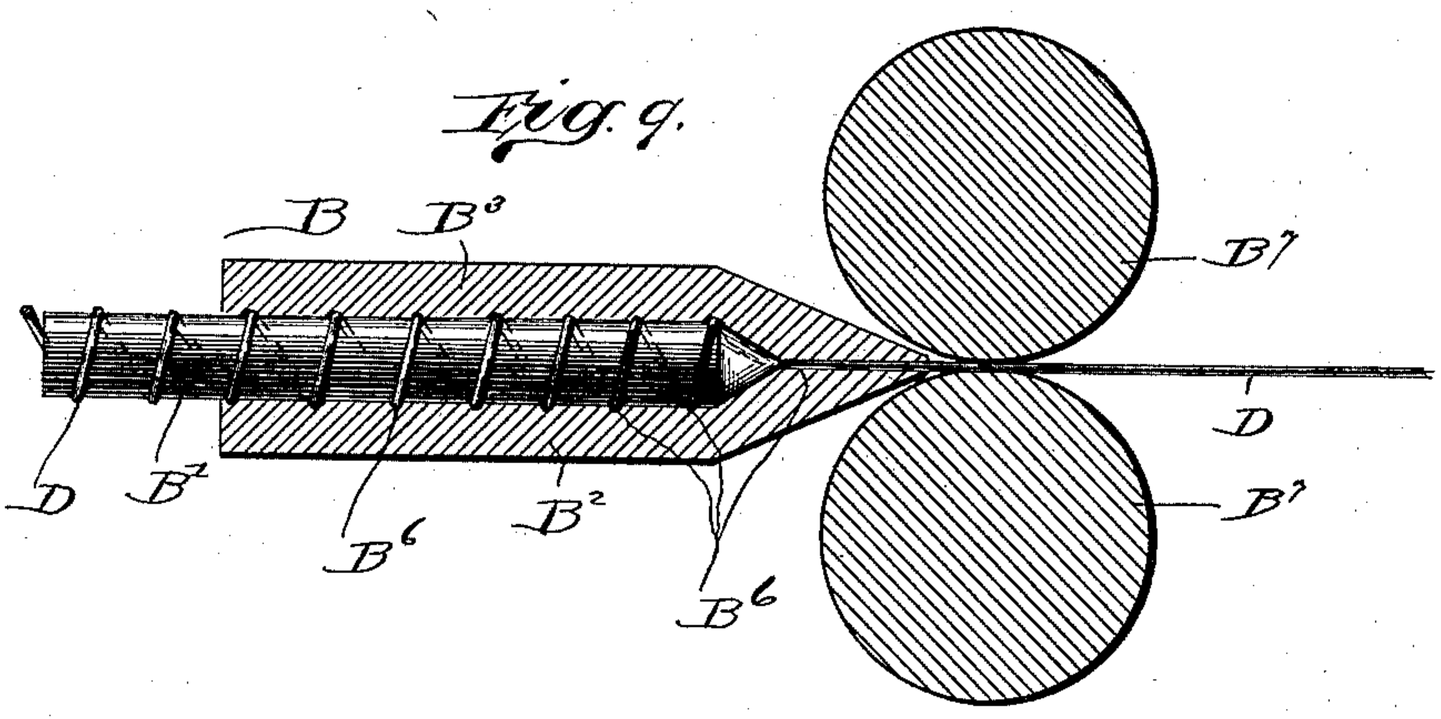


Fig. 11.

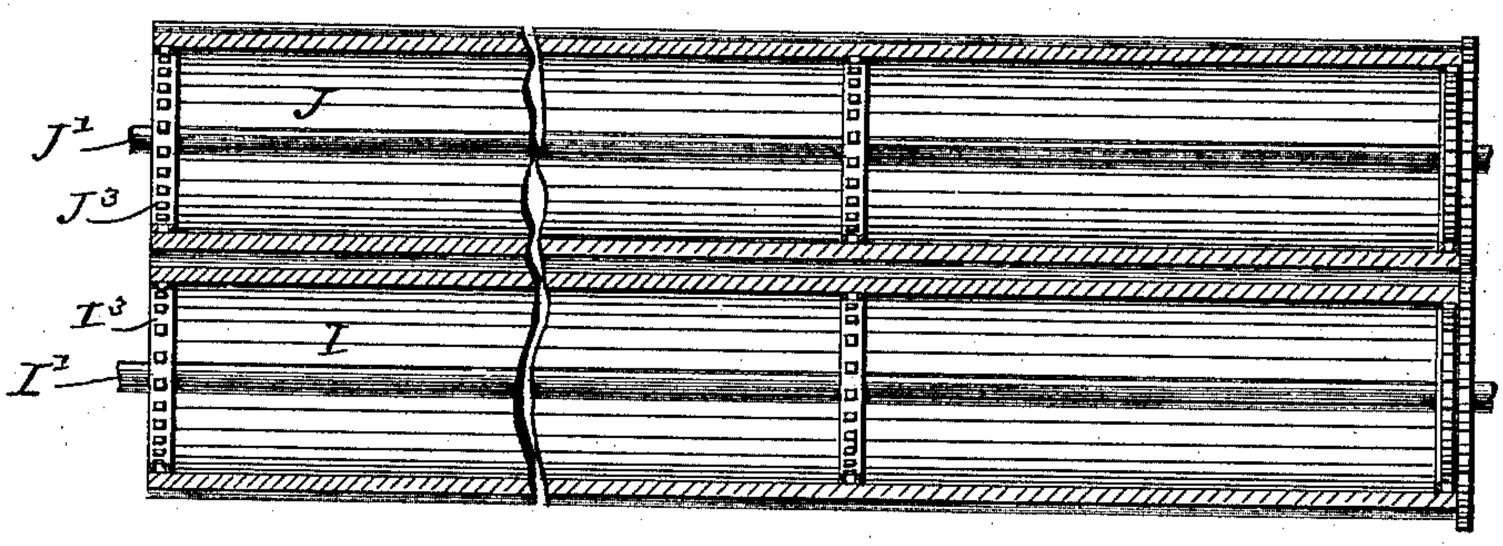
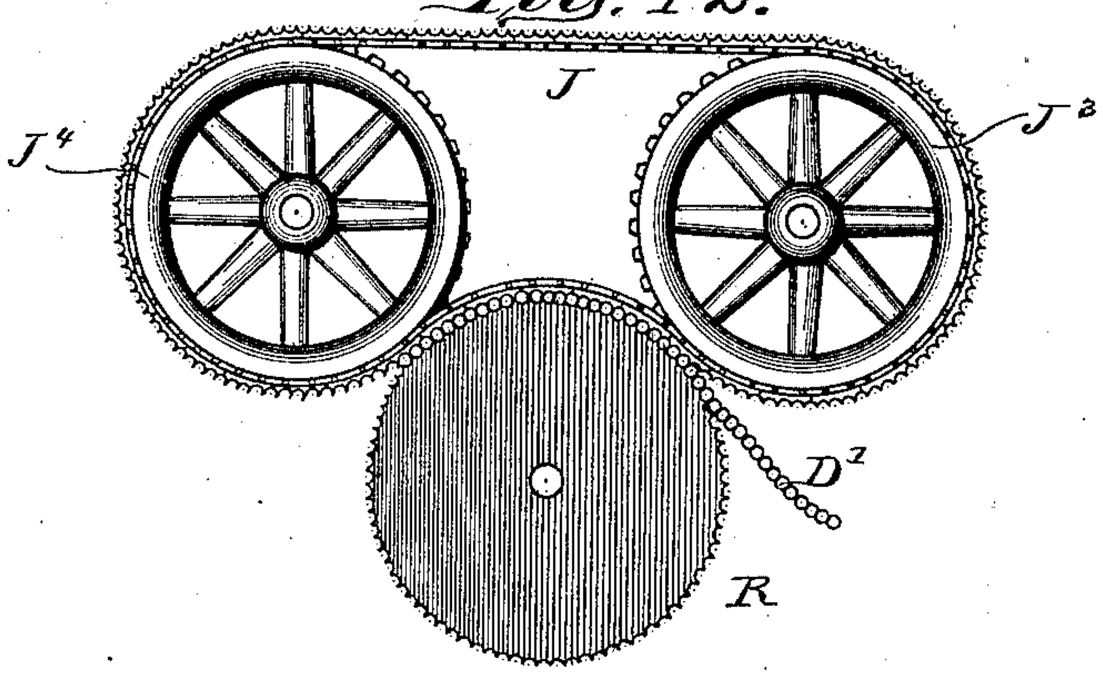


Fig. 12.



Witnesses:
Frank L. Stevens
Ambrose Risdon

Inventor:
Cyrus Kehr.

UNITED STATES PATENT OFFICE.

CYRUS KEHR, OF LAKESIDE, ILLINOIS.

MACHINE FOR WEAVING COILED-WIRE FABRIC.

SPECIFICATION forming part of Letters Patent No. 464,940, dated December 8, 1891.

Application filed April 16, 1891. Serial No. 389,173. (No model.)

To all whom it may concern:

Be it known that I, CYRUS KEHR, a citizen of the United States, residing at Lakeside, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Weaving Coiled-Wire Fabric; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates, particularly, to the weaving of coiled-wire fabric for bed-bottoms and similar purposes, such fabric consisting of parallel longitudinal interlinked spiral wire coils.

One of the objects of my invention is to provide sufficient mechanism for holding the edge of the fabric to which the new coils are being applied and to receive and guide the coils as they are being projected from the coil-forming mechanism. The portion of the mechanism by which this object is attained is adapted to use in machines embodying only one or more than one coiler.

My improvement relates also to certain details of construction, as will hereinafter appear.

In this class of machines the wire is coiled by being forced through a spiral die or passage, and for this purpose a variety of mechanism has been heretofore devised, and it is therefore deemed unnecessary to describe such mechanism at length.

In the accompanying drawings, Figure 1 is a plan. Fig. 2 is a side elevation. Fig. 3 is a vertical transverse section in line *a b*, looking to the left in Fig. 1. Fig. 4 is a vertical section in line *a b*, looking to the right in Fig. 1. Figs. 5 and 6 are detail views of the mechanism for holding the edge of the fabric and receiving the new coils. Figs. 7, 8, and 9 are details of the coil-forming mechanism. Fig. 10 is a diagram illustrating the timing of the cams which control the coil-forming mechanism, the knives, and the movement of the fabric-holding mechanism. Fig. 11 is a section in line *a c* of Fig. 1. Fig. 12 shows a modified coil-receiving mechanism.

A is a table rising to a suitable height and of proper width and length to support the operating mechanism. The portion of the table at the right in Figs. 1 and 2 is called the "head" of the table and the portion at the left in said figures is called the "foot" of the table and the corresponding ends are also called the "head" and "foot" of the machine. The machine may embody only one coiler, but the drawings illustrate two.

B is a coiler located at the head of the machine, and C is a coiler located at the foot of the machine. Both are located upon the table and are in the same plane and have their coiling-axes parallel to each other and separated a little less than the diameter of one coil, so that the coils simultaneously projected from these coilers will intertwine and have their axes separated. These coilers may be of any suitable construction. The drawings show them both composed of similar parts, and a description of the coiler B will therefore be sufficient for both.

B′ is a spindle lying between blocks B^2 and B^3, the former resting upon the table and the latter being clamped upon said spindle by bolts B^4, located in an arched standard B^5, rising from the table A. At the right there is an opening B^6 of proper size to allow the passage of the wire D, and said passage leads to the spindle B′ and thence spirally forward around the latter. A pair of rolls B^7 are arranged at the head of the coiler and geared to feed the wire forward into the passage B^6.

F and F′ are band-wheels seated upon a shaft F^2, extending longitudinally beneath the table A, the wheel F being keyed to said shaft and the wheel F′ being loose thereon. When a belt is placed upon the wheel F, the shaft F^2 is rotated continuously, and when it is desired to stop the rotation of said shaft the belt is shifted to the loose wheel F′. F^3 is a clutch surrounding said shaft F^2 and feathered thereon, so that it may be shifted longitudinally, but must rotate with the shaft F^2. F^4 is a bevel-gear loosely surrounding said shaft F^2, but designed to be at times engaged with the clutch F^3, and during such engage-

ment said wheel F^4 is forced to rotate with said shaft F^2. The said bevel-wheel F^4 engages with another bevel-wheel F^5, located upon a horizontal transverse shaft F^6, and the latter shaft supports a large spur-wheel F^7, which latter meshes into a smaller spur-wheel F^8, fixed upon the shaft of one of the rolls B^7. By this train of mechanism the rolls are driven so as to feed the wire D forward through the coiler B. A similar train of mechanism is located at the foot of the machine and similarly connected with the shaft F^2 to drive the coiler C.

The clutches F^3 may be shifted into and out of engagement by means of bell-cranks G and a cam H, located upon the shaft F^2. The vertical arm of each of said bell-cranks engages one of the clutches, and the horizontal arms approach each other and rest over the cam H, the elbow of said cranks being pivoted to the table A. The meeting ends of the horizontal arms of the bell-cranks are preferably united, so that they and the clutches controlled by them must move in unison as the extended portion H′ of the cam H passes beneath said meeting ends. A coiled spring G′ is joined by one end to one of said arms and by the other end to the shaft F^2 or some other relatively fixed object, and serves to hold the meeting ends of the bell-cranks normally down in contact with the cam H, so that the clutches F^3 are normally in engagement with the wheels F^4. The raising of the meeting ends of said horizontal arms of the bell-cranks draws the vertical arms of said bell-cranks toward the middle of the machine, so that said clutches are drawn away from and out of engagement with the bevel-wheel F^4, whereby the train of mechanism concerned in driving the coiler is stopped. Said train of mechanism is so speeded that one coil is formed by the coiler for each rotation of the shaft F^2, less a portion of said rotation covered by the interval required for cutting the wire and shifting the fabric. In Fig. 3 the extension H′ is shown as covering about one-tenth of the periphery of the cam H, and when this proportion exists the coil must be formed during a nine-tenths rotation of the shaft F^2. When the machine is thus stopped, the wire is to be cut and the fabric shifted transversely to the coiling-axis before the coilers are again started. Both of these steps may be performed by hand or by mechanism operated by hand; but I have devised automatic mechanism for this purpose, which mechanism is arranged in such relation to the shaft F^2 as to be actuated by the latter at suitable intervals.

I and J are endless aprons, each stretched upon a pair of horizontal parallel shafts and meeting in the plane in which lie the coiling-axes of the coilers B and C. The meeting faces of these aprons are of such construction that they will together form passages for the coils of the fabric.

I is the lower apron, and I′ is the apron-supporting shaft at the rear of the machine, and I^2 the roll at the front as the machine stands in Figs. 1 and 2.

J′ and J^2 are the corresponding shafts supporting the apron J. Said aprons may lie directly upon said shafts, the latter being then of considerable diameter; but I show them as resting upon sprocket-wheels I^3 I^4 and J^3 J^4, the aprons being composed, respectively, of sprocket-chains I^5 and J^5, surrounding the said sprocket-wheels, and longitudinally-channeled strips I^6 and J^6, secured to said sprocket-chains. It will be understood that in lieu of the sprocket-chains other chains or endless and jointless metallic bands may be used, the wheels I^3 I^4 and J^3 J^4 being then provided with smooth peripheries. The strips I^6 and J^6 may be of sufficient width to cover the width of several coils *d* of the fabric D′, and the channeling for one coil is to extend into the channeling for the adjacent coils, in order that each coil may reach into the space occupied by the coil at each side and interlink with the latter. The coilers are shown arranged to project coils into the space between the aprons I and J to the front of the machine, as shown in Figs. 1 and 2, and at the left, as shown in Figs. 3 and 5.

In operation a coil is projected from one of the coilers into one of the spaces between the aprons and another coil is projected into one of the adjoining spaces and intertwined with the first-mentioned coil. The coilers are then stopped and the wire cut between the coilers and the aprons. The aprons are then simultaneously progressed in the direction indicated by the arrows in Fig. 5, so that the two coils just made will be shifted toward the rear of the machine and two vacant spaces or passages will be brought opposite the coilers. The coilers are then started and a coil projected into each of said spaces, such coils intertwining with each other and one intertwining with the forward of the two previously-made coils. The aprons are then again made to progress in the direction indicated by the arrows in Fig. 5, so that two vacant spaces are again formed, and the forming of two coils is again repeated, and so on indefinitely, the fabric finally issuing from between the aprons at the rear of the machine, as shown in said Fig. 5. It will be seen that in this manner the edge of the fabric to which the new coils are being applied is positively held, and the coils being formed are provided with definite paths, so that they must intertwine with the last-finished coils of the fabric and with each other.

In order that the two aprons may travel in unison two of the shafts, as I′ and J′, are each provided with a spur-gear S and S, one meshing into the other. The said aprons may be progressed in several ways; but it is manifestly preferable to cause their progression by automatic means. The drawings show for this purpose a ratchet mechanism actuated from the power-shaft F^2.

I[7] is a ratchet-wheel located upon the head end of the shaft I[2] with teeth directed away from the direction of rotation necessary to rotate the aprons, as indicated by the arrows.

I[9] is a rock-shaft supported horizontally beneath the table A and having at one end the dog I[8], engaging the teeth of the ratchet-wheel I[7], and having at the other end an arm I[10], extending to a cam I[11], located upon the shaft F[2] and having an extension I[12]. When said extension I[12] passes beneath the arm I[10], the free end of the latter is raised, the rock-shaft I[9] and the dog I[8] thrown forward, so as to turn the wheel I[7], shaft I[2], and the aprons I and J sufficiently to move two coil-spaces out of the coiling-axes and bring two more coil-spaces into the coiling-axes. An expanding spring *i*[9] may be inserted between the table A and said arm I[10] in order to hold the latter normally in its depressed position.

L is a knife supported immovably close to the path of the forming-coil at each end of the aprons, and L′ is a movable knife arranged in opposition to the knife L at the side of the wire of the forming-coil opposite the knife L. In other words, the wire of the forming-coil passes between said knives. Said knives may be operated manually or mechanically by different means; but the drawings show an arrangement for operating them simultaneously from a single cam located upon the shaft F[2].

L[2] is a shaft extending lengthwise of the machine and parallel to the coiling-axes and journaled in bearings L[3] and supporting at its ends the knives L′. At the middle of said shaft L[2] an arm L[4] extends from said shaft to the cam L[5], located upon the shaft F[2], and has an extension L[6]. When said extension passes beneath said arm, it raises the latter, tilts the shaft L[2], and presses the free ends of the knives L′ down on the wire of the coils, so that the latter is cut. An expanding coiled spring *l*[4] may be located between the table A and the arm L[4] to hold said arm normally against its cam.

The modification shown in Fig. 12 comprises the coil-receiving mechanism consisting of one endless apron and a roller R, bearing against said endless apron, a surface of the roller and of the endless apron being arranged to form spaces between the meeting faces of said roller and said apron. It will be seen that the roller and the apron are each a movable part of the mechanism characterized by having an endless surface, and whether two endless aprons or one endless apron and a roller are used there are combined an endless apron and a movable part having an endless surface.

I claim as my invention—

1. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and having one side meeting a portion of said other part in line with the coiling axis or axes, there being guiding-spaces between said first-mentioned endless surface and said endless apron for the passage of the coils, substantially as shown and described.

2. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and meeting a portion of said endless surface in line with the coiling axis or axes, said movable part and said endless apron having each upon its surface cavities so spaced as to be opposite each other at the meeting of said movable part and said endless apron and together forming channels to receive the coils, substantially as shown and described.

3. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless fluted surface and an endless fluted apron arranged parallel to and to bear upon said movable part in line with the coiling axis or axes, substantially as shown and described.

4. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and having one side meeting a portion of said other part in line with the coiling axis or axes, there being spaces between said first-mentioned endless surface and said endless apron for the passage of the coils, a power-shaft, and intermittent driving mechanism intervening between said power-shaft and said coil-forming mechanism, and intermittent driving mechanism intervening between said power-shaft and said coil-receiving mechanism, substantially as shown and described.

5. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and meeting a portion of said endless surface in line with the coiling axis or axes, said movable part and said endless apron having each upon its surface cavities so spaced as to be opposite each other at the meeting of said movable part and said endless apron and together forming channels to receive the coils, a power-shaft, and intermittent driving mechanism intervening between said power-shaft and said coil-forming mechanism, and intermittent driving mechanism intervening between said power-shaft and said coil-receiving mechanism, substantially as shown and described.

6. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless fluted surface and an endless fluted apron

arranged parallel to and to bear upon said movable part in line with the coiling axis or axes, a power-shaft, and intermittent driving mechanism intervening between said power-shaft and said coil-forming mechanism, and intermittent driving mechanism intervening between said power-shaft and said coil-receiving mechanism, substantially as shown and described.

7. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and having one side meeting a portion of said other part in line with the coiling axis or axes, there being spaces between said first-mentioned endless surface and said endless apron for the passage of the coils, a power-shaft, and intermitting driving mechanism intervening between the power-shaft and the coil-forming mechanism, coil-cutting mechanism located between the coil-forming mechanism and the coil-receiving mechanism, and intermittent actuating mechanism located between said power-shaft and said cutting mechanism, substantially as shown and described.

8. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and meeting a portion of said endless surface in line with the coiling axis or axes, said movable part and said endless apron having each upon its surface cavities so spaced as to be opposite each other at the meeting of said movable part and said endless apron and together forming channels to receive the coils, a power-shaft, and intermittent driving mechanism intervening between the power-shaft and the coil-forming mechanism, coil-cutting mechanism located between the coil-forming mechanism and the coil-receiving mechanism, and intermittent actuating mechanism located between said power-shaft and said cutting mechanism, substantially as shown and described.

9. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of a movable part having an endless fluted surface and an endless fluted apron arranged parallel to and to bear upon said movable part in line with the coiling axis or axes, a power-shaft, and intermittent driving mechanism intervening between the power-shaft and the coil-forming mechanism, coil-cutting mechanism located between the coil-forming and the coil-receiving mechanism, and intermittent actuating mechanism located between said power-shaft and said cutting mechanism, substantially as shown and described.

10. In a machine for weaving coiled-wire fabric, the combination, with coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and having a portion of its surface meeting said other part in line with the coiling axis or axes, there being spaces between said first-mentioned endless surface and said endless apron for the passage of coils, of two coilers in line with contiguous coil-receiving spaces between said apron and said movable part, substantially as shown and described.

11. In a machine for weaving coiled-wire fabric, the combination, with coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and having a portion of its surface meeting said other part in line with the coiling axis or axes, there being spaces between said first-mentioned endless surface and said endless apron for the passage of coils, of two coilers located at opposite ends of said coil-receiving mechanism and in line with contiguous coil-receiving spaces, substantially as shown and described.

12. In a machine for weaving coiled-wire fabric, the combination, with the coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and meeting a portion of said endless surface in line with the coiling axis or axes, said movable part and said endless apron having each upon its surface cavities so spaced as to be opposite each other at the meeting of said movable part and said endless apron and together forming channels to receive the coils, of two coilers in line with contiguous coil-receiving spaces between said apron and said movable part, substantially as shown and described.

13. In a machine for weaving coiled-wire fabric, the combination, with the coil-receiving mechanism consisting of a movable part having an endless surface and an endless apron arranged parallel to and meeting a portion of said endless surface in line with the coiling axis or axes, said movable part and said endless apron having each upon its surface cavities so spaced as to be opposite each other at the meeting of said movable part and said endless apron and together forming channels to receive the coils, of two coilers located at opposite ends of said coil-receiving mechanism and in line with contiguous coil-receiving spaces, substantially as shown and described.

14. In a machine for weaving coiled-wire fabric, the combination, with coil-forming mechanism, of coil-receiving mechanism consisting of two endless aprons having meeting faces in line with the coiling axis or axes, with guiding-spaces between said faces for the passage of the coils, substantially as shown and described.

15. In a machine for weaving coiled-wire fabric, the combination, with coil-forming mechanism, of coil-receiving mechanism consisting of two endless aprons having meeting faces in line with the coiling axis or axes,

with cavities in their faces so spaced as to be opposite each other at the meeting of said faces and together forming channels to receive the coils, substantially as shown and described.

16. In a machine for weaving coiled-wire fabric, the combination, with the coil-forming mechanism, of coil-receiving mechanism consisting of two endless fluted aprons arranged parallel to each other and to meet in line with the coiling axis or axes, substantially as shown and described.

17. In a machine for weaving coiled-wire fabric, the combination, with the coil-receiving mechanism consisting of two aprons arranged parallel to each other and with meeting faces having spaces for the passage of wire, of two coilers arranged in line with the meeting faces of said endless aprons and in line with contiguous coil-receiving spaces, substantially as shown and described.

18. In a machine for weaving coiled-wire fabric, the combination, with the coil-receiving mechanism consisting of two aprons arranged parallel to each other and with meeting faces having spaces for the passage of wire, of two coilers arranged at opposite ends of said aprons in line with contiguous coil-receiving spaces, substantially as shown and described.

19. In a machine for weaving coiled-wire fabric, the combination, with coil-forming mechanism, of coil-receiving mechanism consisting of two endless aprons supported by shafts and having meeting faces in line with the coiling axis or axes, with guiding-spaces for the passage of the coils, and intermeshing gears, one mounted upon a shaft of one of the aprons and the other mounted upon a shaft of the other apron, substantially as shown and described.

20. In a machine for weaving coiled-wire fabric, the combination, with coil-forming mechanism, of coil-receiving mechanism consisting of two endless aprons supported upon shafts and having meeting faces in line with the coiling axis or axes, with guiding-spaces between said faces for the passage of the coils, and a ratchet mounted upon one of said shafts, and a driving-shaft, and a cam and pawl intervening between said driving-shaft and said ratchet, substantially as shown and described.

21. In a machine for weaving coiled-wire fabric, the combination, with the coil-receiving mechanism consisting of two endless aprons arranged with meeting faces having spaces between them for the passage of the coils, of a coiler arranged at each end of said coil-receiving mechanism, a knife arranged at each end of said coil-receiving mechanism, a rock-shaft, to which each of said knives is connected, a driving-shaft, and a cam driven by said driving-shaft and arranged in such relation to said rock-shaft as to actuate the latter, substantially as shown and described.

In testimony whereof I affix my signature, in presence of two witnesses, this 13th day of April, 1891.

CYRUS KEHR.

Witnesses:
FRANK L. STEVENS,
AMBROSE RISDON.